—— Zum Klima von Abbessinien. P. 242.
Ekholm, Nils. Die Extinktion des Lichtes im Weltall. Pp. 242-244.
Annalen der Hydrographie und Maritimen Meteorologie. Hamburg. 13 Jahrgang.
Darwin, George Howard. Ebbe und Flut sowie verwandte Erscheinungen im Sonnensystem. Pp. 278-282.
—— Bericht der Deutschen Seewarte über Ergebnisse der magnetischen Beobachtungen in den deutschen Küstengebiete und in den deutschen Schutzgebieten während des Jahres 1901. Pp. 295-299.
—— Magnetische Beobachtungen an Bord der "Valdivia" wärend der deutschen Tiefsee-Expedition 1898-99. Pp. 299-304.

NOTES AND EXTRACTS.

METEOROLOGICAL CONDITIONS FOLLOWING THE ST. VINCENT AND MARTINIQUE ERUPTIONS.

The two nearest stations of the United States Weather Bureau to Martinique are Bridgetown, Barbados, latitude 13° 4′ north, longitude 59° 37′ west, and Basseterre, St. Kitts, latitude 17° 18′ north, longitude 62° 48′ west. St. Pierre, Martinique, is at about latitude 14° 45′, longitude 61° 10′, or 150 miles northwest of Barbados and 200 miles south-southeast of Basseterre. St. Vincent is about 100 miles west of Barbados and nearly 300 miles south-southeast of Basseterre. The observer at Bridgetown, Mr. J. J. O'Donnell, was thus considerably nearer the scene of the eruption than the observer at Basseterre.

In response to a letter sent out by the Chief of Bureau, Mr. O'Donnell forwarded extracts from his daily journal, as follows:

May 7, 1902.—Cloudy; varying conditions of cloudiness overcast the sky in the early morning, upper clouds moving from the west, lower clouds from the east; toward noon the upper clouds began to increase in density, while taking on a somewhat hazy appearance, which at 1 p. m. had a decidedly lurid hue. The cumuli from the east became more compact, and at 1:30 p. m. had assumed a thick and firmly-set mammilated shape, with a decidedly ashen hue. From a point on the western horizon there radiated a conical beam of a greenish or phosphorescent tint, about 50° in length and 20° wide at the base, north and south of which the lurid hue of the cirro-stratus emitted a diffused reddish light. At 2 p. m. the mammilated cumuli had reached the zenith and descended upon and overspread the conical beam, while the sun's disc was overcast only by a dense haze. Beneath the conical beam and generally toward the west the water of the Caribbean Sea presented a calm, quiet, and gently swelling surface of a gruesome, sickly, greenish tint.

Pressure and temperature normal, with light and steady southeast wind after 8:35 a. m.

The unusual phenomena had attracted many persons to the roofs of the houses in the city and several visitors to the Weather Bureau office. At 1:47 p. m. a terrific explosion was heard, followed eight seconds later by another of at least equal intensity, while on the roof at 2:06 p. m. a peculiar rumbling sound, closely resembling the noise of a tornado, was heard, and it seemed to rush close to or through the surface of the ground, rather than through the air. Darkness was rapidly setting in; the air had a strong sulphurous odor, and all persons on the roof of the Weather Bureau office were observing the fishermen yet off the horizon rapidly scudding home to port. At 3 p. m. it was necessary to light lamps in the office, the hotel, and in all business offices not already closed; 3 p. m. being the hour at which all business is usually discontinued for the day. At 3:45 p. m. thunder was heard moving from the west, accompanied by lightning, from 4:15 to 6 p. m.; the thunder was one continuous roar, while the occasional lightning emanated as from a disc about 20 inches in diameter on the western horizon and was at all times of an incandescent character, resembling an electric arc or search light of immense intensity or candle power and always disappearing or vanishing in a purple glow. From 6 to 8 p. m. the thunder was at intervals of eight to ten minutes, but much louder and of a detonating character, but not always preceded by the lightning or electric flash. After 8 p. m. the thunder continued at intervals of fifteen to twenty minutes and did not decrease in intensity, while the brilliancy of the incandescent lightning continued until past midnight.

At 2:15 p. m. some grains of coarse dust, resembling No. 3 gunpowder, fell at the office; from 3:40 to 4 p. m. similar dust fell sparingly and intermittently; from 4 p. m. until past midnight it fell thick and fast without interruption. Impenetrable darkness prevailed from 4:30 p. m., or from one hour before sunset. East winds prevailed until 8:35 a. m. and from 10:50 p. m. until past midnight; southeast winds the rest of the day; maximum velocity, 13 miles per hour.

The shower of dust and the explosion heard at 1:47 p. m. are believed to have been caused by the eruption of the Souffrière on the island of St. Vincent, 100 miles due west from Barbados, and which was reported to have occurred at 12:30 p. m. through the public telegrams received at 2:30 p. m.; the barograph trace indicates a decided jar at 2 and 3 p. m.

Remarks.[1]—Several persons report having heard between 2 and 3 p. m. as many as seven explosions in groups of three, two, and two; many report having heard only four explosions in groups of two and two, and others say they heard only two explosions, and those the last; all agree in saying that the last two were the loudest.

The ordinary height of spring tides is 3 feet; new moon occurred at 6:47 p. m.; the tide was high at 3 p. m. At 3:10 p. m. the water suddenly rose 2.5 feet in two minutes and as rapidly fell after one minute; about three minutes later it rose 1.25 feet in three minutes, and as rapidly fell, then rose about 0.8 foot in two minutes and again rapidly fell. The water rose and fell three times in fifteen or twenty minutes, the rise each time being about one-half what it was before. These measurements were made by Mr. C. B. Sidney, timekeeper for the superintendent of public works, and Mr. Walter C. Ashby, engineer in charge of repairing the wharf destroyed by the hurricane of 1898.

May 8.—Cloudy; the fall of volcanic dust ceased at 5:10 a. m., total depth one-quarter of an inch. Thunder was heard from 1 to 4 a. m. Strato-cumulus, stratus, and scud overcast the sky all day; the atmosphere was muggy, close, and sultry, with dense haze until 3. p. m.

Remarks.—No explosion or thunder was heard during the forenoon, and no change occurred in the water level in the harbor.

May 11.—An exceedingly brilliant orange tinted glow lighted up the whole western sky from 5:30 till 6:45 p. m., which afterwards slowly dissipated, the moon's disc meantime presenting a beautiful ultra-marine blue color.

May 14.—From 5 to 6:30 p. m. the west and northwest sky presented a brilliant orange tinted hue, diminishing in luster and entirely dissipating at 7:10 p. m.

May 20. *Remarks.*—Some persons report having heard two loud explosions in the north at 4:43 a. m [local time]. The barograph trace shows a decided jar at about that time.

Mr. O'Donnell adds in his letter:

It may be remarked that the explosion that preceded the eruption of Souffrière, on the island of St. Vincent on the 7th was as loud, if not louder, than any explosion from Mount Pelee, especially that on the 8th, when St. Pierre was destroyed.

Mr. E. H. Hobbs, Observer in charge at Basseterre, St. Kitts, forwards traces from the Richard barograph, and reports as follows:

The copies of the barograph traces fail to show the smaller fluctuations that are visible on the originals. There have been numerous squalls throughout the month and each has left its trace on the barograph record, but besides these there are many variations that were the effect of the volcanic explosions. Many more explosions were heard in the mountains than were noticed in town, but the actual times are unobtainable, owing to variations in the local clocks.

On the 7th I noticed several slight tremors but attributed them to the moving of goods in the store below and took no especial notice of them until I was told of the explosions heard in the mountains and in the other islands. They were not like our usual earthquake shocks, which are vibratory and last for several seconds, but were short and more like a sudden jar. These occurred at the time the cables were broken.

On the 8th similar noises, but not so loud and without the tremors, were heard in the early morning and were described as the discharge of distant cannon.

On the nights of these two days, the tops of thunder heads were seen far to the southeast and south and the reflection of distant lightning was observed; since that time the southern horizon has been too obscure to see the reflections farther away than thunder could be heard. Every day some persons have claimed they heard explosions, while others have said that it was a thunderstorm, so that it is impossible to separate the two phenomena.

On the 7th and 8th I made special inquiry and observations of my own in regard to a tidal wave or a change in level of the sea, but none was observed and I am positive there was none on this side of the island, and none was reported from the other side. The sea was comparatively

[1] The Weather Bureau observers invariably employ seventy-fifth meridian time in recording their own observations, but local times are given in these remarks as quoted from other sources.

smooth at the time and any change would have been quickly noticed.

The wind has been light most of the month. In the upper strata it has varied between west-southwest and northwest, when observed, so that very little smoke or dust has been visible in the upper atmosphere, the most of it being carried to the eastward. In the lower strata the winds have been very variable. They were about east for two days following the explosion, but beyond a murkiness of the southern horizon nothing was observed until the night of the 11th and on the 12th, when the wind shifted to the southeast and a slight smokiness was seen in all directions. It was very thin and scarcely perceptible except through long distances, and then only in the lower atmosphere. On the 13th and 14th the wind shifted to the southwest and the smoke became denser. It seemed to cause huge cumuli to form but instead of producing rain they would break up into fragments and disperse as they advanced farther northward.

On the 17th the wind shifted back to the east and northeast and a bluish colored haze or smoke was seen, entirely different in appearance from that hitherto observed, and on the afternoon of the 17th, some time before sunset, the sky became a brilliant yellow, so bright at times as to be painful to the eyes; since the 17th there have been frequent showers and very little, if any, haze or smoke, with the exception of the evening of the 24th, when the moon was observed to shine with a sickly greenish yellow light, the circle of light around it shading away to a reddish brown.

On the 19th the pumice was first observed on the northeast and east coast of this island, and on the 20th the driftwood made its appearance.

On the 20th, at 4:56, 4:57, and 5:56 a. m., three loud and distinct reports were heard; these were much louder than any that had occurred before and caused much uneasiness among the people. (The time given is seventy-fifth meridian.)

People living on the mountain estates report having heard the reports the night before, and in some instances during the entire night; the reports were accompanied by shocks in many places and were strong enough to rattle the sheet-iron roofing on verandas.

No disturbance of the sea discernible to ordinary observation accompanied these detonations.

On the 22d the heaviest thunderstorm in many years occurred shortly after noon. It started in the northeast, circled around the island and went back into the east. During the height of the storm a small tornado destroyed three thatched huts and stirred up a rough sea on the northern side of the island; no persons were injured or further damage reported.

On the 24th the moon was seen shining through smoke or dust in the eastern horizon; since that time the sky has been almost wholly overcast with clouds.

The 25th was a stormy day, with rain and high wind. On the night of the 25th and the early morning of the 26th heavy rains were reported from Nevis. A considerable amount fell here, 8.86 inches being reported at one estate and between 10 and 11 inches at another in the space of three and a half hours. Much damage is reported to the roads and waterworks.

On the 26th the day was cloudy and rainy with southerly winds, and the entire coast was lined with drifting wood, cane tops and canes, and rubbish of all descriptions, from Martinique.

On the 27th no rain fell during the day and the clouds were a little thinner and gave a glimpse of the sun now and then; this kind of weather is almost unknown in this locality. The sunset on this day was the first that showed the effects of the dust and smoke in the upper air, the sky being of a red color which lasted long after sunset and had the appearance of a distant fire.

The humidity has been and is still unusually high. No upper clouds have been seen above the alto-stratus since the 22d; those observed, usually alto-cumulus, were moving slowly from the west.

On June 6 the loudest explosion thus far was heard at 9:42 a. m. It was reported as occurring at 10:15 a. m. by the royal mail steamer *S. Alden*, which was leaving Fort de France at the time. The barograph trace shows the wave effect quite distinctly, as well as another about an hour before. Many explosions were reported from different localities, the greatest number, 34, by a person in Nevis. They were most numerous between the hours of 5 and 6 and 10 and 11 a. m.

On June 7 the haze was so dense as to entirely obscure the island of Nevis, 13 miles distant. Captain Cary, of the steamship *Korona*, reports light blue haze visible at St. Thomas, and the island of St. Kitts entirely obscured this morning until within 3 miles of land.

On June 8 the haze was dense, but appeared to be decreasing in the lower atmosphere. What seemed to be volcanic dust from Martinique was found deposited on the sunshine recorder this morning. It probably came down with the rain last night.

In the Jamaica weather report, No. 280, May, 1902, Mr. Maxwell Hall states:

The dust haze from the volcanoes in Martinique and St. Vincent was first noticed on the 7th, it was strong on the 10th and strongest on the 16th. It seems to have traveled with the trade winds at the rate of 12 or 13 miles an hour. The dust which fell on Barbados was carried there by the upper atmospheric current, which is from west to east.

Mr. H. H. Cousins, recently appointed as government meteorologist for Jamaica, adds to the above statement:

A small sample of dust collected at Hanbury, Shooter's Hill, Jamaica, was compared with a sample of dust sent from Barbados and found to be identical therewith in composition. The particles of the Jamaica dust were finer in grade.

Volcanic dust has been reported from other places as follows:

May 7.—Capt. D. Edwards, of the steamship *Louisiana*, left Barbados for Trinidad at 5:30 p. m. He says: "We steamed through this rain of dust for a distance of 90 miles, and at a low estimate one inch of it fell on the decks."

May 8.—Latitude 11° 21′ north, longitude 57° 47′ west (Martinique northwest 300 miles, St. Vincent west-northwest 250 miles), Capt. T. Thomas, of the steamship *Coya*, reports a fall of dust that was thickest from midnight of the 7th to a. m. of the 8th, with absolute darkness at 1:30 a. m.

May 8.—Captain Dennison, barque *Buchwood*, reports that at noon, in latitude 13° 22′ north, longitude 49° 50′ west (Mount Pelee west by north 660 miles), a fall of dust commenced, which continued until noon of the 9th, in latitude 14° 46′ north, longitude 51° 27′ west (Mount Pelee west 540 miles).

May 8.—Captain Corbett, of the barque *Eleanor M. Williams*, reports a very heavy fall of ashes from 3 to 8 p. m. in latitude 14° north, longitude 51° west (Martinique 250 miles west).

May 11–12.—Latitude 10° 32′ north to 12° 8′ north, longitude 52° 26′ west to 55° 56′ west, Capt. J. W. Slater, of the barque *Kings County*, reports the water discolored, probably by volcanic dust.

Capt. J. W. Curtis, barque *Ethel Boynton*, Philadelphia to Cartagena, May 11–June 2, reports the water discolored from the Mono Passage (Martinique east-southeast 400 mtles) southward to latitude 15° north and carrying particles which appeared to be volcanic ashes.

June 7.—After a severe thunderstorm that occurred during the previous night, ashes were swept from the upper deck of the steamer *Porto Rico*, at anchor near Ponce, Porto Rico. These ashes are thought to have come from an eruption on June 6 of Mont Pelee, 325 miles to the southward.

For some of the above items we are indebted to the National Geographic Magazine, July, 1902.

Afterglows appear to have been observed as follows: Bridgetown, Barbados, and Basseterre, St. Kitts, as already noted, and in the Hawaiian Islands, as recorded by Mr. Curtis J. Lyons on page 260 of this current REVIEW. In a letter dated May 26, 1902, Mr. Lyons adds the following:

The full moon also showed the effect of the upper haze in its feeble light. By day the lavender-gray haze is visible around the sun, with a radius of about 30°, the rest of the sky being blue, and no haze resting on terrestrial objects, showing the great elevation of the smoke layer or dust layer.

From the 10th to the 12th I had already noticed a gray haze and recorded it, but we had heard nothing of the eruption and no red afterglow was seen.

Capt. J. W. Salter reports that he first noted a peculiar red appearance of the sky on May 9, latitude 7° 26′ north; longitude 43° 51′ west, that increased each day until he reached Barbados on the morning of May 14.

Santiago de Cuba, A. V. Randall, Observer, United States Weather Bureau:

On May 13 and 16 the atmosphere was slightly hazy; during the evening twilight of May 24 and 25 and also of June 13 and 14 the sky and clouds were of a decidedly pink color, particularly in the west.

Havana, Cuba, W. B. Stockman, Forecast Official:

At Havana on the evening of June 9 there was (during the early evening) a fringe of strato-cumulus along the horizon and at a slightly greater altitude a circle of alto-stratus. At about 7:30 p. m. the alto-stratus began to assume a bright copper color, which at 8:05 p. m. became very brilliant; after the latter hour the glow decreased and the color of the clouds became normal about 8:30 p. m. The most brilliant color was noticed in the west, while the east, north, and south, respectively, were next in point of brilliancy. The glow was noticed only on the alto-stratus; the strato-cumulus along the horizon appearing normal throughout the evening. It is believed this was due to volcanic ashes.

Mr. E. H. Plumacher, United States Consul, Maracaibo, Vene-

zuela, under date of June 30, 1902, wrote regarding the unusual appearance of the sky at sunrise and sunset since the Mount Pelee eruption, the sky near the horizon being colored red, and the sun having a greenish hue. Also during the day, and especially in the forenoon, a large ring of prismatic colors surrounded the sun; and the heavens, which should be deep blue, showed a steel-gray color.

In Nature, for July 3, 1902, W. J. S. Lockyer refers to the afterglows observed at the Solar Physics Observatory, South Kensington, London, England, on June 22, 26, 27, 28, and 29, and at Bombay, India, on about the same dates.

These are by no means all the reports of the afterglows that have reached us. An especially brilliant one is reported to have been observed at Los Angeles on June 22 and 23 and a less brilliant one at Miami, Fla., on May 23, by P. H. Ralfs, Plant Pathologist, Department of Agriculture. All the above reports must, however, be received with caution, since brilliant sunsets often occur that have no connection with volcanic eruptions.—*H. H. K.*

NOISES ATTENDING THE ERUPTION OF MOUNT PELEE.

The eruption of Mount Pelee on Martinique, latitude 14° 45′ north, longitude 61° 10′ west, appears to have been heard as far away as Maracaibo, Venezuela, latitude 10° 45′ north, longitude, 71° 45′ west, a distance of about 12° of a great circle, or 830 English miles. In a report from E. H. Plumacher, United States Consul at Maracaibo, after some remarks on the weather that have, of course, no relation to the earthquake, he says:

On the morning of the great calamity that has fallen upon the island of Martinique, strong rumbling sounds were heard here, as well as in the other parts of this state. At many places during the day before the catastrophe noises of heavy cannonading were heard at La Ceiba, Cabimas, Perija, and Quisiro. At Sinamaica the people thought that a great battle with heavy artillery was in progress near Maracaibo. * * * This is very natural when we keep in view our revolutionary tendencies.

Early in the morning of the catastrophe I found that my servant had saddled my horse; when I asked him if somebody was sick and needed a doctor, he answered that he thought I needed my horse to go to the city, as a big battle must be going on, judging from the sounds of the heavy firing of guns. Observing the same sounds, I knew at once that it could not be heavy artillery, for if all of the cannons of Venezuela were fired together they could not produce such sounds.

It was not like cannonading with heavy siege guns; it was neither thunder nor the strange unpleasant subterranean sounds of convulsions of the earth; it was as if immense explosives were fired high up in the clouds. * * * Last night (May 12) after eleven o'clock we had a slight horizontal trembling movement from a southwesterly direction.—*C. A.*

DUST STORM AND MUD SHOWER.

Several communications have been sent us respecting a shower of discolored rain that fell in a number of the Middle Atlantic States on April 13. An area of low barometer accompanied by thunderstorms crossed the Great Lakes to the Atlantic coast during the night of the 12th, and was followed by a high area, giving heavy winds. The following extracts indicate that vast quantities of dust must have been taken up by the wind on the dry western plains, and that it was precipitated with the rain over the States farther east.

From the Republican, Belvedere, Ill., April 12, 1902:

A dust storm in the middle of April is almost an unheard of thing, and laying aside the fact that yesterday's (April 11) deluge of dirt came in a month when the earth should be saturated with moisture, it was remarkable for being the worst dust storm in this section at any season for some years. The most recent approach to this storm was about six years ago when red dust was brought from the western plains by a high wind and deposited on the snow, giving it a sinister dark blood-like appearance.

The unprecedented dry weather had prepared the earth for the visitation of the wind yesterday and when the strong gale set in from the west it picked up the dust and particles of debris in clouds and whirled it through the air.

The clouds of dust were carried high in the air and hung like a pall over everything. The sun was almost completely obscured. Casual observers thought that the sky was cloudy and that there was a possibility of rain, but closer observation revealed the fact that what seemed to be murky, low-hanging clouds was in reality a veil of dust hanging between heaven and earth. Along toward evening the setting sun reddened this cloud and gave it the appearance of coming from a distant fire.

Rev. Robert C. Caswell writes from Stroudsburg, Pa., as follows:

On Friday afternoon, April 11, about 4 o'clock, very black clouds gathered in the southwest, and passed on eastward, but there was only a very slight sprinkle of rain. The next morning, Saturday, the air was filled with what seemed like smoke; but considering the great rains we had had all the week we were certain the woods were not on fire. The air got thickest about 12 or 1 o'clock, when it resumed its normal clearness. There was a slight sprinkle of rain about the middle of the day, lasting only five minutes, but the rain instead of being clear was muddy. My friend, Mr. W. H. Truslow, who lives just outside South Stroudsburg says that the new sails of his sailing canoe which he had just hoisted for the first time were sprinkled all over with thin mud, as also were the windows of his house (southern aspect).

Mr. J. H. Jewett, Canandaigua, Ontario County, N. Y., sends a sample of white cotton cloth that was spotted by the shower at that place. It has much the appearance of having been mildewed.

Rev. Geo. P. Sewall writes from Aurora, Cayuga County, N. Y., as follows:

Last Saturday, April 12, a strange phenomenon was witnessed in a remarkable shower sweeping from the west and extending the entire length of the lake (Cayuga), 40 miles. How much farther it may have reached I do not know, but I have waited to glean positive testimony before writing you to ask if you can give any satisfactory explanation.

All Saturday forenoon the air was very calm, but a strange ashy-looking, very dense mist hung over the lake. The atmosphere was heavily charged with moisture, but no rain fell until noon, when a sudden downpour dashed upon us from clouds which were so dense as to throw a pall of darkness over everything. Some say the light over the lake was of a pinkish color. To me it was more the hue of the sand dunes of Michigan City. Once having passed us the cloud filled the eastern sky with inky blackness. So threatening was the appearance of the sky upon the approach of the shower that many feared a veritable cyclone [tornado]. At this point, however, the wind was not severe, nor was it destructive in this vicinity, so far as I can learn. The shower once upon us, it was discovered to be surcharged with sand, or mud, which discolored or soiled everything exposed to it. Our windows were besmeared with muddy water; ridges of light colored sand lay along our tin roofs when the moisture dried away; on my veranda floor before the water evaporated the deposit had the appearance of coal dust or finest black mud; towels and coverlids on the grass bleaching had to be rewashed, they were so thoroughly soiled; in Ithaca umbrellas caught in the shower looked as if they had been trailed in the mud, and farmers in the fields or on the roads in Aurellus, north of us, say they could feel the sand on their faces. Careful examination with a strong microscope showed the deposit to be composed of minute particles of various shapes, some like the tiny grains of wheat, mustard seed, or tiny cylinders, while others were brilliant transparent crystals, no two of which were alike in shape, but looked like mica or flakes of quartz. No one here had ever before witnessed such a phenomenon, and all wonder whether some terrific cyclone prevailed west of us to carry up such volumes of dust and bring them great distances to thus hurl them down here over so wide an area.

From newspaper clippings we learn that the mud rain was observed at Smithfield and Middle Smithfield, Pa., at the Delaware Water Gap, and at towns along the Hudson from Elizabeth, N. J., northward to Newburg and Poughkeepsie, N. Y.; and from Science, for May 30, 1902, p. 872, that it was also observed at Easton Pa., and New Haven Conn.—*H. H. K.*

SCIENCE IN POETRY.

In venturing to publish a poem in the MONTHLY WEATHER REVIEW, the Editor owes it to himself and his readers to quote as justification the occasional practise of several other scientific journals which do not decline to publish contributions that are so eminently true to nature as is the present description of the general phenomena of a West Indian hurricane. Our correspondent, when living on the banks of the Hudson, read in the daily papers a telegram from Washington announcing the steady approach of the hurricane of September, 1897. It was while listening to the rush of the preliminary northeast winds